

## CLAIMS

What is claimed is:

1. A peptide-amphiphile composition comprising:
  - 5 a first peptide-amphiphile or salt thereof with a hydrophilic region, said region having a first biological signal and an ionic charge associated therewith; and
  - a second peptide-amphiphile or salt thereof with a hydrophilic region, said region having a second biological signal and an opposite signed ionic charge associated herewith.
- 10 2. The peptide-amphiphile compositions of claim 1, wherein the first peptide and second peptide are in a charge equivalent ratio.
3. The peptide-amphiphile composition of claim 1, wherein the first and second peptide-amphiphiles are oppositely charged.
4. The peptide-amphiphile composition of claim 1, wherein said first peptide or said  
15 second peptide includes an amino acid sequence which promotes adhesion of nerve cells with said first or second peptide-amphiphiles.
5. The peptide-amphiphile composition of claim 1, wherein said first or second peptide-amphiphile includes the amino acid YIGSR.
6. The peptide-amphiphile composition of claim 1, wherein said first or said second  
20 peptide includes a peptide sequence that promotes axon outgrowth in cells.
7. The composition of claim 1, wherein said first or second peptide-amphiphile includes the amino acid sequence IKVAV.

8. The composition of claim 1, wherein the first or second peptide-amphiphile includes an amino acid with a functional moiety capable of intermolecular covalent bond formation.
9. A composition comprising self-assembled positively-charged peptide-amphiphiles incorporating a first biological signal and a negatively-charged peptide-amphiphiles incorporating a second biological signal.
10. The compositions of claim 9 including peptide-amphiphiles with amino acids sequence promoting cell adhesion.
11. The composition of claim 9, wherein said peptide-amphiphiles include amino acid sequences chosen from the group consisting of IKVAV and YIGSR.
12. A composition comprising:  
  
an aqueous solution of a first peptide-amphiphile composition which has a positive net charge at substantially physiological pH and which includes a first biological signal; and  
  
an aqueous solution of a second peptide-amphiphile composition which has a negative net charge at substantially physiological pH.
13. A method of treating a patient with tissue engineered material comprising:  
  
administering a peptide-amphiphile composition to a site in need thereof, said peptide-amphiphile composition capable of stimulating or inhibiting a plurality of biological signals at said site, said peptide-amphiphile compositions capable of forming a nanofiber network.
14. The method of claim 13, wherein said peptide-amphiphile composition is comprised of a first peptide-amphiphile with a first biological signal, having a charge, and a second peptide-amphiphile having an opposite charge.

15. The method of claim 14, wherein said second peptide-amphiphile includes a second biological signal.
16. A tissue defect filler comprised of a self-assembled peptide-amphiphile compound which itself includes at least two biologically relevant signals.